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(12) **United States Patent**  
Gordin et al.(10) Patent No.: **US 6,340,790 B1**  
(45) Date of Patent: **\*Jan. 22, 2002**(54) **MEANS AND METHOD FOR INTEGRATED  
LIGHTING FIXTURE SUPPORTS AND  
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(\*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **08/967,579**(22) Filed: **Nov. 1, 1997****Related U.S. Application Data**

(63) Continuation of application No. 08/791,641, filed on Jan. 28, 1997, now abandoned, which is a continuation of application No. 08/278,999, filed on Jul. 22, 1994, now abandoned, which is a continuation of application No. 07/652,557, filed on Feb. 6, 1991, now abandoned, which is a continuation-in-part of application No. 07/472,822, filed on Jan. 31, 1990.

(51) Int. Cl.<sup>7</sup> ..... **E04H 12/24**(52) U.S. Cl. .... **174/45 R; 174/45 R; 362/249; 362/396; 362/431; 405/232**(58) Field of Search ..... **174/45 R; 362/249; 362/396, 431, 432; 405/232**(56) **References Cited****U.S. PATENT DOCUMENTS**595,600 A 12/1897 Buck  
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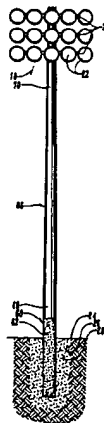
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A device and method for rigidly elevating a structure includes a base member securable in the ground and which has a portion extending above the ground. A pole section, having a bore inside a lower end, and an upper end, can be stacked upon the base member upwardly by slip fitting the pole section onto the base end and securing it in place. A flexible, easily transportable and durable system is thereby created for elevating structures. An integrated pole for elevating light fixtures and all other necessary components such as electrical components, can be predesigned, shipped, and easily installed at a desired location. A pole top member, including rigidly secured cross arms, can be inserted on the top of a pole. All wiring for both the pole top cross arms, and the pole itself can be preconfigured and require simple connection of plugs between wiring segments. Additional features can include ballast boxes which quickly attach to the pole by easy mounting brackets, and which also allow communication with the interior of the pole to allow easy electrical connection of its components. Still further, the wiring can be protected and reliably secured in the pole by structure and methods which deter abrasion or slippage. The entire assembly can be shipped and quickly, and easily assembled on site without intensive labor, equipment, or cost.

**20 Claims, 14 Drawing Sheets***Combination with the lighting*

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and the mechanical structure reduces the chances of required maintenance. Features such as built in ears or tabs allow the attachment of maintenance equipment and these considerations can be analyzed from the very beginning design of the installation.

It can therefore be seen that the base according to one embodiment of the invention, comprised of the prestressed, precast concrete, can be plumbed in a bore in the ground, and then concrete can be poured around the base to effectively increase its size. Since the concrete only needs to have compressive strengths, it can set up quickly. The whole process then ensures the base is plumb and secure for any type of hole it needs to support.

This ties in with the ability then to be ensured that the top of the pole will also be directly vertically above the base. As previously described, this allows the design of the system to be prepacked and shipped to the installation site. The entire unit can then be installed. It is virtually then reassembled on site as a composite, integrated, unitary installation according to the predesign parameters.

The most efficient utilization of the lighting fixtures can therefore be preplanned at the factory and integrated with other lighting fixtures and poles for the particular location. All of the fixtures can then be reliably predesigned to provide an efficient composite photometric beam. The lighting fixtures, no matter how many, can basically be designed as a part of the pole structure. They can be quickly installed so that the entire array of fixtures on each pole can then be quickly aimed to create the smooth, efficient, composite beam. The field or area to be lighted can be predefined to have an orthogonal coordinate system. The poles and light fixtures can therefore accurately be predicted as to where they will exist in that coordinate system to make this composite beam in lighting possible.

Still further, it is disability to reliably predict the position of the fixtures prior to installation, that allows other needed components for the lighting installation such as ballast, capacitors, wiring, etc., to be predesigned and at least partially preassembled and sized at the factory. This in turn allows for a quick economical and easy installation on site which is of very important economic value.

It can furthermore be seen that the present invention allows the utilization of a straight pipe for center piece 226 of pole top 224, as seen in FIG. 30. By methods known in the art, the bottom end 228 can be tapered by flaring it so that it can be integrated with the tapered upper end 230 of pole 222. It is to be understood that pole top center piece 226 would cost almost ten times as much if it had to be prefabricated in a tapered fashion.

It will therefore be appreciated that the present invention can take many forms and embodiments. The present preferred embodiment is in no way intended to limit the scope thereof which is defined solely by the claims set forth below.

For example, various of the components can be utilized separately from the other components with advantageous results. The quick attach ballast boxes, the pole structure, the pole top member, the abrasion resistant devices, and pre-configured wiring are examples of just a few.

The ballast boxes can be mounted at any location around the perimeter of the pole. Sometimes they are preferred to be in back of the pole.

Additionally, these various advantageous features can be used in any combination with one another that is reasonable and desired.

What is claimed is:

1. A combination of tall pole and cross arms for elevating a plurality of large wattage light fixtures, which is partially

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pre-assembled and pre-wired, then conveniently shipped, and then completely pre-assembled and pre-wired prior to erection at the location of installation of the pole in the ground, comprising:

- a base including a lower portion adapted for insertion and anchoring in the ground or to other supporting structure and an upper portion having an outside diameter;
- a hollow pole shipable in one or more sections, having a top with an upper open end and a bottom with a lower open end, which is mateably slip-fittable over at least a portion of the upper section of the base;
- a plurality of lighting fixtures mounted to one or more cross arms;
- a pole top including an elongated hollow vertical portion which is mateably slip fittable over the top of the pole, a hollow extension extending laterally from the elongated hollow vertical portion to each fixed cross arm, interior passageways in each cross arm communicating with openings at spaced apart positions in each cross arm defining attachment locations for the plurality of lighting fixtures;
- pre-wired cables between lighting fixtures and the hollow section, the pre-wired cables terminating in a header which is accessible through an opening in the top pole which is sealable by a removable cover member;
- pre-sized cables having a connection to said header and a length to extend from said header through the interior of the pole to in the vicinity of the base when the apparatus is assembled;
- adjustable connection mounts between the attachment locations on each cross arm and the lighting fixtures to allow pre-assembly of lighting fixtures to each cross arm and pre-aiming of lighting fixtures prior to shipping, and final pre-aiming once at the installation location;
- slip fit joints between any pole sections and between said pole top and the top of the pole to allow final assembly of the tall pole with the pole top and fixtures on the ground at the assembly location, with pre-wired cables extending in the hollow pole, and including a component for securing the cables in place in the pole, a component for deterring abrasion of the cables with the interior of the pole and a second header to electrically connect said cables to the header the pole top, to complete pre-wiring from the fixtures to at or near the bottom of the pole when the pole and pole top are on the ground;
- a ballast box with a mounting bracket;
- a bracket on the exterior near the bottom of the pole to allow mounting of the ballast box to the bracket on the pole when the pole is on the ground, the brackets including a receiver member on the pole means and a capture member near the top of the ballast box, to allow securement of the top end of the ballast box to the pole, the pole having an opening and a hollow connecting piece space apart from and below the receiver which mates into a receiving opening near the lower end of the ballast box;
- internal pre-wiring between pre-assembled electrical components in the ballast box, including multiple ballasts for the plurality of light fixtures, in the ballast box, and connectors to connect up with the cables in the pole; and
- a connection in the ballast box for quick connection to service lines to electrically connect the electrical cir-

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cuitry of the pole to an electrical power source so that the pre-assembled tall pole can then be erected onto said base in the ground, with all light fixtures pre-assembled, pre-aimed, and pre-wired to a ballast box and electrical power source.

2. The apparatus of claim 1 wherein the pole has a tapered bottom end for slip fitting to a tapered top end of the pole section.

3. The apparatus of claim 1 wherein the cross arms are extended out in front of the pole top.

4. The apparatus of claim 1 including light fixtures having mounting brackets which can be oriented with respect to the position of the cross arms to the pole top and to predetermined aiming directions.

5. The apparatus of claim 1 wherein the brackets on the exterior of the pole include a receiving section for receiving a locating member attached to the ballast box to automatically position a portion of the ballast box with respect to the pole, and a securing section to allow the ballast box to be generally secured at the location of the locating member to the pole but being pivotable on the securing section.

6. The apparatus of claim 5 wherein the ballast box included an aperture which is mateable over an extension conduit surrounding an aperture in the pole when the ballast box is pivoted on the securing section to a position adjacent the pole to allow electrical wiring in the pole section to communicate with electrical wiring in the interior of the ballast box.

7. The apparatus of claim 1 further comprising a plurality of ballast boxes and brackets for mounting the plurality of ballast boxes to the exterior of the pole section.

8. A method of assembling an integrated light pole and electrical components for hollow metal light poles elevating a plurality of large wattage light fixtures, but allowing substantial pre-assembly prior to erection and installation, and allowing shipping by over the road transportation vehicles, comprising:

determining the location for the light pole and the plurality of light fixtures to be elevated by the light pole; determining the desired height of the light pole at that location;

positioning an upper portion of a base above the ground when a lower portion of the base is positioned in the ground, mateably slip fitting the bottom of the pole over the upper section of the base;

slip fitting a hollow pole top to the top of the pole before erection, the pole top including one or more hollow cross arms to which are mounted a plurality pre-aimed, pre-wired lighting fixtures;

pre-wiring the pole top prior to insertion on top of the pole by electrically connecting the lighting fixtures to a wiring harness in the pole top;

extending pre-configured, pre-sized wiring through the interior of the pole and connecting the preconfigured, pre-sized wiring to the wiring harness in the pole top;

mounting at least one ballast box to quick attach brackets on the exterior of the pole a predetermined distance up the pole, but away from the top of the pole;

pre-wiring the electronic components of each ballast box prior to mounting the ballast box, the quick attach brackets including one member which cooperates with a component at one end of the ballast box to allow pivotable movement of an opposite end of the ballast box towards an opening in the pole;

adding abrasion resistance members to the wiring through the pole top and the pole;

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securing the wiring at a location in the pole top; and erecting the combined pole and pole top onto the base secured in the ground at the location, so that pre-wiring and pre-assembly is completed before erection to eliminate the need for wiring, assembly, or fixture aiming once the pole is erected yet having durable protection of wiring.

9. The method of claim 8 wherein the base is made of reinforced concrete.

10. The method of claim 8 wherein the pole is made of tubular metal.

11. The method of claim 8 comprising the step of matching the diameters and lengths of the base and pole according to desired strength, height, and weight of the pole and any structure attached to the pole.

12. The method of claim 8 further comprising constructing the pole of one or more pole sections, each having an opening in a bottom portion and in an upper portion, and being slip fittable sequentially to each preceding pole section.

13. The method of claim 12 further comprising the steps of: moving the base to a pre-excavated hole in the ground; adjusting the base so that it is generally plumb; filling the remaining areas of the excavated hole with a material to stabilize the base means in the hole; and slip fitting a first pole section to the base.

14. The method of claim 13 further comprising slip fitting one or more additional pole sections sequentially beginning with the first pole section.

15. The method of claim 8 further comprising:

determining the needs of the integrated light pole by considering one or more of the set comprised of height, weight, and distribution of the one or more light fixtures which are to be suspended, when loaded;

determining the needs of the base to support the pole by considering one or more of the set comprised of (a) desired pole, (b) type of ground, (c) type of mounting in the ground, and (d) stress at or around the base;

selecting a configuration for the pole from one or more of the set comprised of (a) number of sections of the pole, (b) shape of each section, (c) length of each section, (d) largest diameter each section, (e) sheet thickness and gauge of each section, (f) steel tensile strength of each section, and (g) type of steel of each section;

selecting a configuration of the base by considering one or more of the set comprising (a) the set used in selection the configuration of the pole, (b) diameter of the base, (c) amount of the base covered by the pole when connected, (d) type of concrete used in the base, (e) treatment of the concrete used the base and rebar structure used in the base, (f) wall thickness, (g) stress, (h) type of steel used with pole, (i) joint strength, (j) shipping considerations, (k) ground type, and (l) length of taper; and

constructing a desired configuration of the base and pole according to the selected determinations.

16. A light pole for suspending multiple high wattage light fixtures having pre-wired electrical connections comprising:

a base with an entrance opening, a lower portion and an upper portion, the base being anchorable in and near the ground and through which wiring from an electrical power source is connectable to wiring in the base extending down from the light fixtures;

a pole member having a hollow interior channel mateably slip-fittable over at least a portion of the upper section of the base, the pole having an entrance opening along its side above but relatively near its lower end;

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a top insert member mountable by slip fitting on top of the pole, the top insert member including extension members extending laterally from a side of and along the top insert member and cross bars connected at outer ends of the extension members generally perpendicularly to the top insert member, each cross bar having openings along its length adapted for connection of and communication to lighting fixtures; and

channels through the base, pole, and top insert member for complete communication of pre-sized wires from an electrical power source to ballast boxes connected by brackets to the exterior of the pole at the opening along the pole, and to the fixtures connected to the cross bars.

17. The light pole of claim 16 wherein the pole is comprised of at least one section of predetermined height, the predetermined height being a predetermined interior length, the top, insert member, extension members, and cross bars having predetermined lengths through their interiors to the openings in the cross bars the base having a predetermined interior length, and a predetermined number of fixtures being connectable to the cross bars so that wiring length can be approximated and pre determined before installation of the pole.

18. The light pole of claim 16 further comprising abrasion resistance members connected at predetermined lengths along the wires through the length of the pole.

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19. The light pole of claim 16 wherein the wires at least partially are twisted together and covered with an abrasion resistant material.

20. A method of installing in the ground light poles for suspending multiple high wattage light fixtures comprising; determining the required height and strength of a tapered hollow steel pole supporting a plurality of said light fixtures in an elevated position;

manufacturing a pole with characteristics to match the determined height and strength, the characteristics including, but not limited to, diameter and thickness at top, bottom and locations there between;

manufacturing a base which is pre-stressed in design to accommodate the pole, the base having a tapered upper end upon which can be slip fit the tapered bottom end of the pole, the base having a height and a width;

creating a hole in the ground which has a predetermined depth and width correlated to the required volume and area to support the base and pole in a vertical orientation;

positioning the base in the hole;

plumbing the base; and

backfilling concrete, which has compressive strength, in the hole to use the compressive strength to support the base in the hole.

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